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User Manual - preliminary -

Rev. 11.09

LDP-CW 20-50

Before powering on your unit, read this manual thoroughly and make sure your understood it fully.

Please pay attention to all safety warnings.

If you have any doubt or suggestion, please do not hesitate to contact us!

PicoLAS GmbH
Company for Innovative Power Electronics und Laser Technology

Kaiserstraße 100
52134 Herzogenrath

Tel: +49(0)2407-563 58-0
Fax: +49(0)2407-563 58-29
E-Mail: info@picolas.de
Web: www.picolas.de

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LDP-CW 20-50

Fully digital cw-driver for High Power Laser Diodes

- Output current: 0 ... 20 A
- Compliance voltage: 0 ... 50 V
- Output power: 1kW
- Coverage of cw range
- Analog modulation
- Half-Brick size (35 cm²)
- Several protective features
- High efficiency

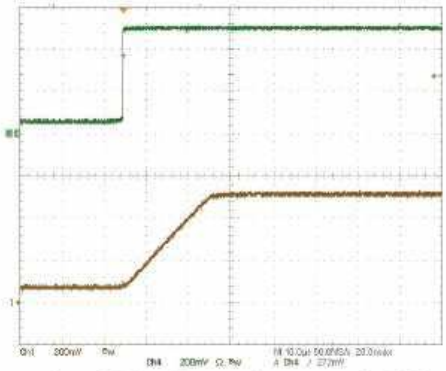

Figure: Soft Start, Current monitor output, scale: 10A/Div

Technical Data:*

Output current	0 ... 20 A
Max. compliance voltage	1 ... 50 V
Current ripple	< 1%
Ripple frequency	> 1 MHz
Current overshoot	< 1 %
Analog modulation (10 A_{pp})	TBD
Current settling time (full-scale)	< 60 µs
Current setting input	Analog or digital
Current monitor	10 A/V
Voltage monitor	0.1 V/V
Supply voltage	12 ... 55 V DC (min. 5 V above laser diode voltage)
Max. power dissipation	45 W
Dimensions in mm	60.9 x 57.8 x 29 Half-Brick size
Weight	194 g
Operating temperature	0 to + 55 ° C

* Specifications measured with a fast recovery diode instead of a laser diode. Technical data is subject to change without further notice.

Product Description:

The LDP-CW 20-50 OEM is a very affordable, compact and efficient current supply for an output power up to 1kW.
The capability ranges from continuous output current to analog modulated waveforms like sinusoidal, rectangular or triangular. The modulation is limited usually by the load inductance.
Intended field of application are laser soldering and welding as well as generic surface treatment and show lasers.
The innovative current regulation concept of the LDP-CW 20-50 produces, compared to the commonly used linear regulation concept, considerably less losses. Hence only one supply voltage is needed for the control logic and the power stage. The current consumption drawn from the power supply only needs to cover the average laser power and is typically much less than 20 A.

Designed to shield your laser diode from damage, the LDP-CW 20-50 features a number of powerful protective safeguards:

- Innovative current regulation concept actively prevents laser diode from overshoots and over-current
- Integrated Soft Start
- Over-temperature shutdown
- Enable/Disable input
- Driver status output
- Protection of the laser diode against reverse currents

Optional Accessories: LDP-C-BOB
PLB-21

PicoLAS GmbH
Kaiserstr. 100
52134 Herzogenrath

Phone: +49 (0)2407 563 58-0
Fax: +49 (0)2407 563 58-29

sales@picolas.de
www.picolas.de

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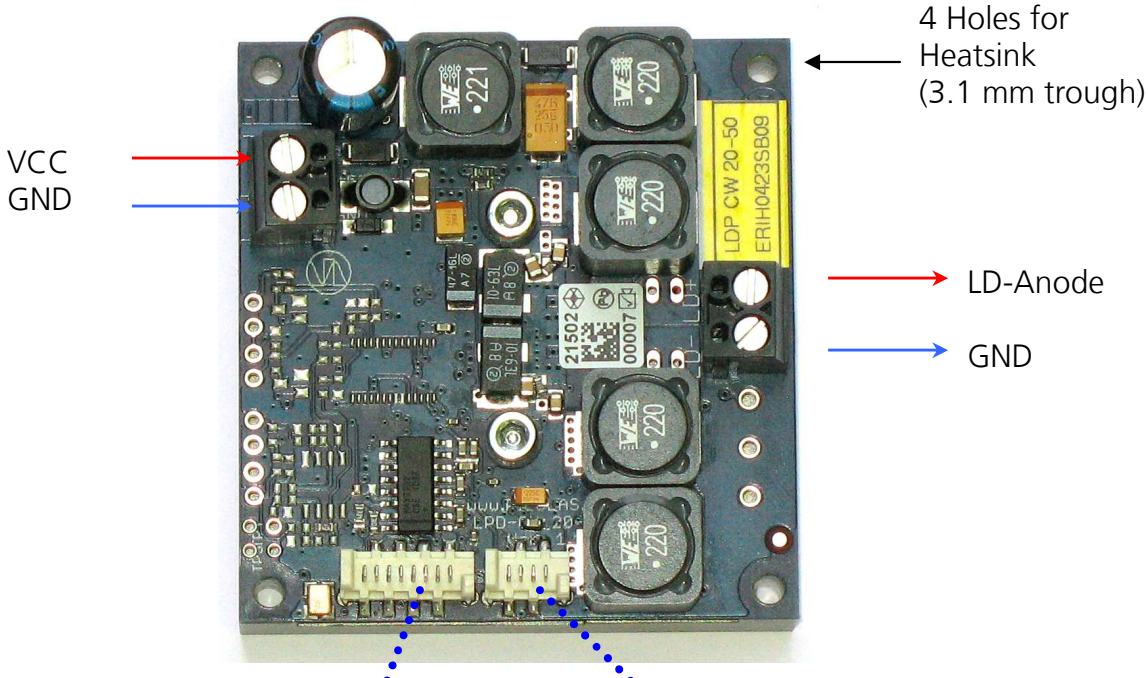
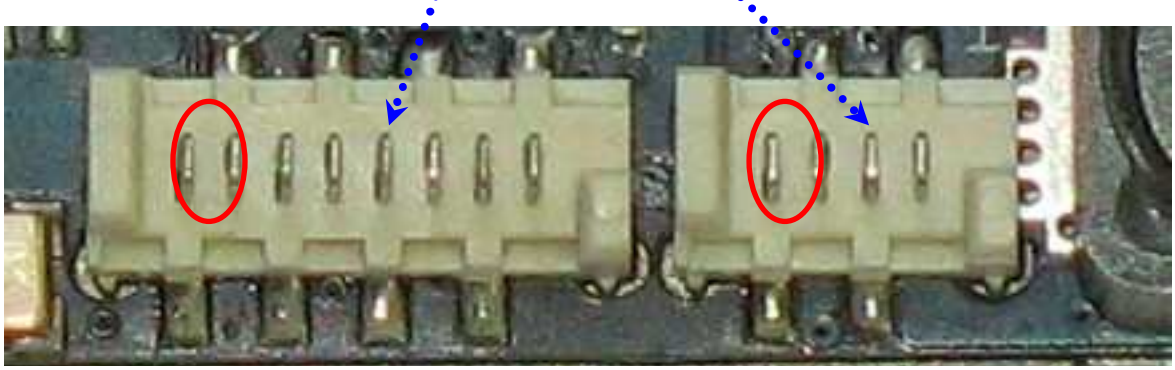
Description of Connections

The following drawing shows all connections that are available to the user.



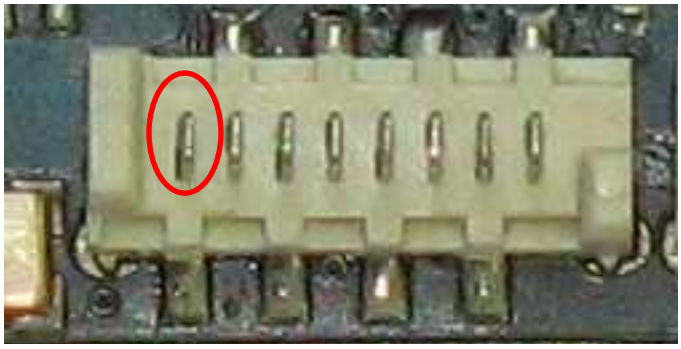


LDP-C-BOB-Connector (Pin 1 marked) RS232 / PLB-Conn.(Pin 1 marked)

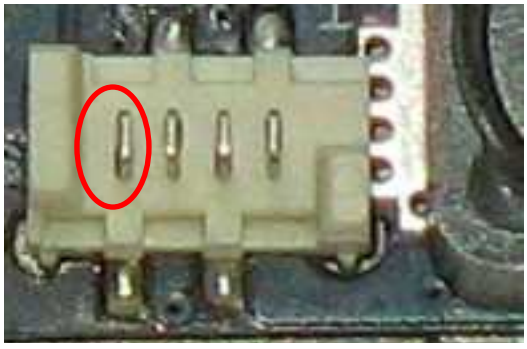
VCC	Supply voltage 12..48V, (56 V absolute maximum)
GND	Supply ground
LD+	Positive laser diode output (anode). Do not connect to ground! Use both connectors parallel for high currents.
LD-	Negative laser diode output (cathode). Do not connect to ground! Use both connectors parallel for high currents.
LDP-C BOB Conn	Mini-MOLEX Connector for analog/TTL-control of the driver (see below)
RS232/PLB21-Conn	Mini-MOLEX Connector for RS232 Communication or the PLB21 (see below)

For a more convenient use of the driver (e.g. in laboratory use) we recommend the optional available product accessory LDP-C-BOB. Please see LDP-C-BOB manual for further details.

Pin-Assignments and Description of the MOLEX-pin header.



Pin Number	Description	Direction	Comments
1 (marked in red)	reserved		Do not connect !
2	reserved		Do not connect !
3	I-Soll	Input	Scale: 150 mV / A
4	Enable-Ext	Input	0 V = disabled, 3.3 V = driver enabled
5	Pulser-Ok	Output	0 V = laser diode driver not ok **or** power up self test not passed yet; 3.3 V = driver ok / test passed
6	GND	Output	
7	reserved		
8 (right)	GND	Output	Do not connect !



Pin Number	Description	Direction	Comments
1 (marked in red)	+12 V	Output	Only for the use with the PLB21, prevent any overload or short! (max. 100 mA)
2	TXD	I/O	RS232-Standard serial interface
3	RXD	I/O	RS232-Standard serial interface
4 (right)	GND	Output	

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How to get started (quick-start without PLB-21)

Step #	What to do	Note
1	Unpack your Device.	
2	Apply the supply voltage.	Apply any voltage between 12 V and 48 V at "VCC" with respect to GND. The Voltage must be at least 5 V higher than the expected compliance voltage of the laser diode driver- Make sure there is no voltage surge that could destroy the unit when switching the power supply on!
3	Wait until "pulser-ok" is high	Pin 5 with respect to Pin 6 must change from 0 V to 3.3 V
4	Apply the current setpoint (scale: 150 mV / A)	For example: apply. 1.5 V to Pin 3 of the BOB-connector with respect to GND (Pin 6) if you want to set current to 10 A
5	Set enable pin "high".	Apply 3.3 V to pin 4 of the BOB connector. The current will ramp up now.
6	Check	If the driver is not properly cooled, it will shut down.

How to get started with an PLB-21

Step #	What to do	Note
1	Unpack your Device.	
2	Connect the PLB-21	Use the PLB-21 pin header and the special cable
3	Apply the supply voltage.	Apply any voltage between 12 V and 48 V to "VCC" with respect to GND. The Voltage must be at least 5 V higher than the expected compliance voltage of the laser diode.
4	Wait until "pulser-ok" is high	Pin 5 with respect to Pin 6 must change from 0 V to 3.3 V
5	Apply the current setpoint	Use the PLB-21 to switch from external to internal setpoint, set the setpoint by turning the dial
6	Set enable pin "high".	Apply 3.3 V to pin 4 of the BOB connector. The current will ramp up now.
7	Check	If the driver is not properly cooled, it will shut down.

Dos and Don'ts

Never make a short at the output. This will not do any harm to the laser driver but will result in an incorrect current measurement.

Keep the connection between power supply and driver as well as the connection between driver and laser diode as short as possible.

Mount the driver on an appropriate heat sink. The driver will shut down under over-temperature circumstances. Depending on the desired current a slight airflow across the black coils on top is necessary. Please keep the temperature of these devices below 85 °C

This diver uses a "high-side" current sensing technique. The GND of the VCC terminal is the same as the GND of the LD terminal.

The driver is CW-operation only.

Absolute Maximum Ratings

- Supply voltage range: +12 V .. +56 V (destroying limit)
- Maximum input current: 20 A
- Maximum laser diode output current: 20 A
- Maximum laser diode compliance voltage: 50 V
- BOB-connector input and output voltages: 0 V to 3.3 V (terminals are 5 V proof)
- BOB-connector output currents: 1 mA
- Auxiliary 3.3 V supply voltage output current: 30 mA (Pin 8 of BOB-Conn planned for Rev 2.1)
- Auxiliary 12 V supply voltage output current: 100 mA (Pin1 of PLB-21 Conn)
- Operating temperature: 0 - 55 °C

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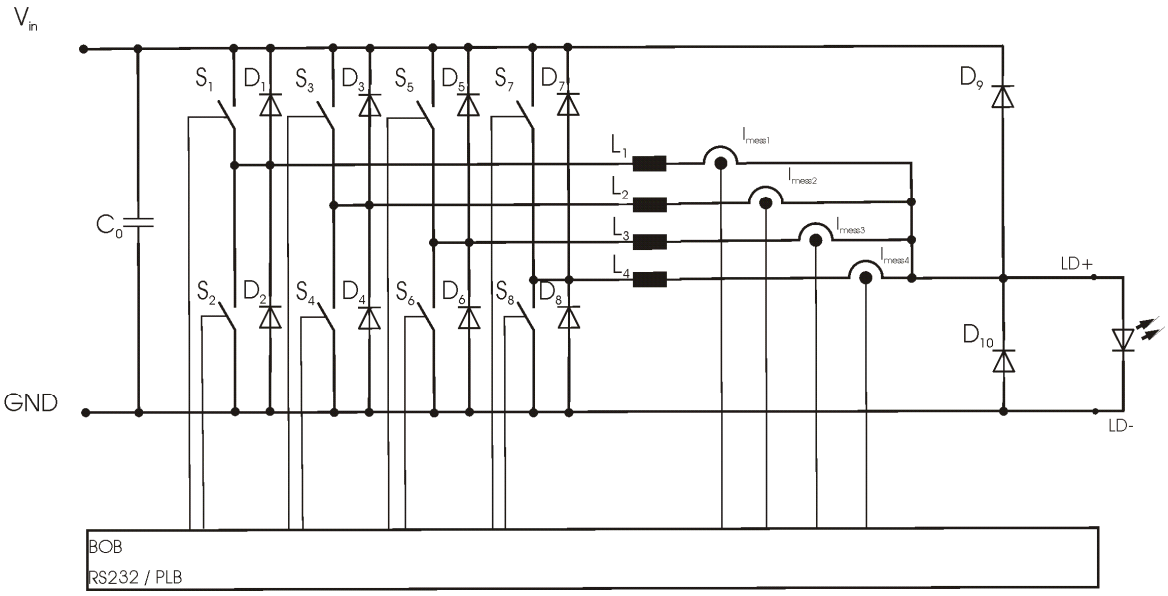
Functional Description

The LDP-CW operates with four parallel buck converters (S1, S2, D1, D2, L1; S3, S4, D3, D4, L2; S5, S6, D5, D6, L3; S7, S8, D7, D8, L4). Every single converter has an independent control loop with a current sensor (Imeas1, Imeas2, Imeas3 and Imeas4). The set point current that is defined by the user is evenly spread over all four converters.

Several security features protect the laser diode and LDP-CW from damage. D8 protects the laser diode from reverse currents while D7 protects the driver in case of a load failure. In case of a failure, the control unit disables the LDP-CW. A soft-start mechanism slowly raises the current after enabling the LDP-CW.



Operation Principle of LDP-CW 20 50 driver

Element	Function
S1, S2, S3, S4, S5, S6, S7, S8, D1, D2, D3, D4, D5, D6, D7, D8, L1, L2, L3, L4	Buck converter
C0	Input buffer capacitor
D7, D8	Laser diode and driver protection diodes

Test Load

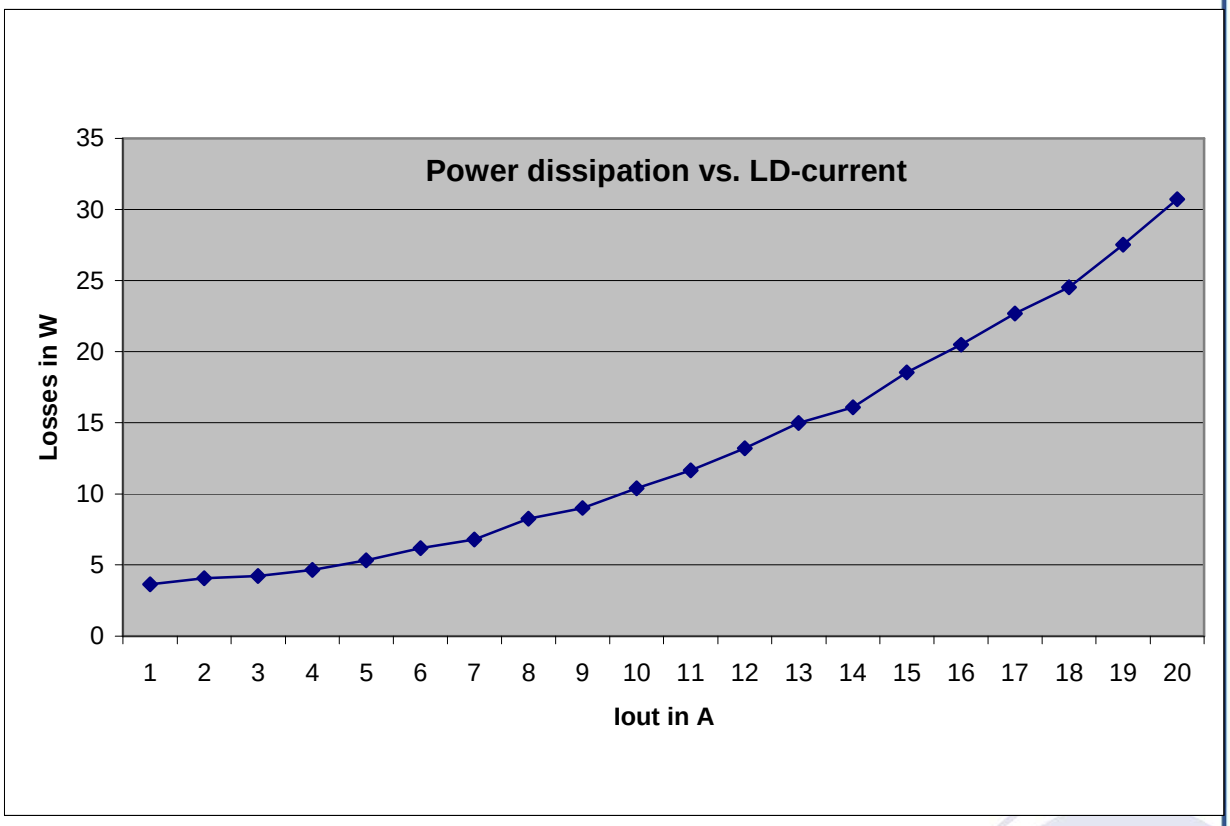
A common method to test the driver is to connect a regular silicon rectifier diode to the driver output. Here has to be paid attention to the junction capacitance of the diode. Only fast recovery diodes (or similar) have a low parasitic capacitance as laser diodes have. To achieve reasonable test results, the parasitic elements of the test diode and the connection must be very similar to a laser diode approach. Regular silicon rectifier diodes have a junction capacitance of several microfarads and are not a suitable test load! The use of these diodes will yield in incorrect current measurement at the pulse edges!

Power Supply

The power supply must be able to cover the output power plus the internal power losses (please see next chapter). Example: you have a 48 V power supply and a Jenoptik JOLD-75-FC-11 laser diode with up to 20 V compliance voltage and a 12 A current (max. values). At 12 A the driver needs at least additional 12 W to cover the internal losses. The total power consumption will be: 20 V x 12 A + 12 W = 252 W. Divided by 48 V this yields 5.25 A (better 6 A) of current consumption at the DC-terminals.

Cooling

The driver produces up to 31 W of losses. Thus the base plate has to be mounted on a heat sink to ensure proper operation and prevent an over temperature shutdown. If working with high currents above 10 A it is recommended to cool the power inductors as well. This can be achieved easily by placing the driver with its heat sink in the air flow of a fan.



Power dissipation over output current

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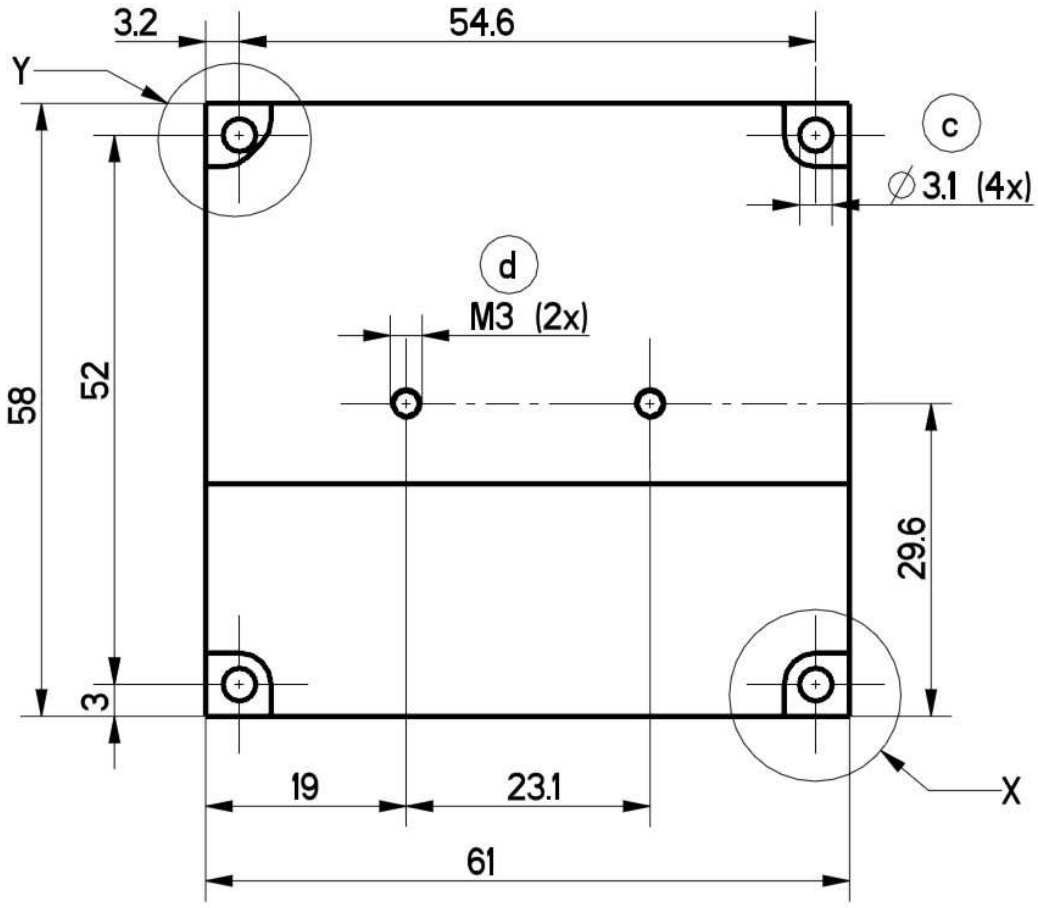
Over Temperature Shutdown

To protect itself, the LDP-CW automatically shuts down itself if its temperature rises above 80°C. This condition is latched and the appropriate bit in the ERROR register is set. To re- enable the LDP-CW the ENABLE pin must be toggled (set low and then high)..

Mechanical Dimensions

Over all height: 30 mm
All dimensions in mm



Power on self test

Each time the driver is powered up, it performs a test of its internal safety features. The driver cannot be enabled until a self test has been performed successfully. The PULSER_OK signal will be pulled high when the test has been successful.
The test will take less than 5 seconds, but can take up to 15 seconds due to internal time-outs if any failures are detected.

Controlling the driver

The driver can be operated stand alone, with a PLB-21 or a PC connected to it via USB. It remembers all settings from the last time it was powered on, unless configured to load default values on power-on. In this case it loads pre-configured settings each time the power is applied. Connecting a digital control to the driver does not alter the internal settings.

No digital control (factory default)

If no digital control (PLB-21 or USB) is attached, only the BOB-Connector could be used to control the driver. If configured so, the pin 10 at the BOB connector ("$I_{setpoint}$") can be used to control the setpoint current. To enable the output pin7 at the BOB connector ("ENABLE") must be set HIGH. If an error occurs (e.g. over temperature), the driver will be disabled and the pin 1 of the BOB connector ("PULSER_OK") is pulled low. The "enable" pin has to be toggled to enable the driver again.
When using the LDP-C series the ENABLE pin enables the driver but not the current output. Pin6 of BOB connector ("PULSE") directly controls the current output in that case. The PULSE input does not trigger a soft start. Hence the configured setpoint current applies as fast as possible to the output.

PLB-21

If a PLB-21 is attached to the driver, it can be used to control the behavior of the driver. The PLB-21 may ask for a driver to download. This must be confirmed with "yes" in order for the PLB-21 to work properly. This must always be done when the PLB-21 was connected to any other PicoLAS product. After the download all operating parameters can be accessed using the PLB-21. For a detailed description see chapter PLB-21 below.

USB

If the driver is connected to a PC using an USB cable, all operating parameters can be accessed via a serial RS232 terminal program or the PicoLAS protocol. The PLB-21 is automatically disabled if a USB connection is established. For a detailed description of the serial text protocol and the PicoLAS protocol see below.

PC

If the driver is connected to a PC, all operating parameters can be accessed via a serial RS232 terminal program or the PicoLAS protocol. For a detailed description of the serial text protocol and the PicoLAS protocol see below.

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Controlling the driver using a PLB-21

To control the driver with a PLB-21 it must be connected via the enclosed cable. The PLB-21 will not work if the USB and the PLB-21 are connected at the same time.
When the PLB-21 is connected the first time to the driver the user is asked to download a new driver. This must be confirmed with "yes" for working the PLB-21 properly.

Menu Structure

The following diagram shows the structure of the PLB-21 menu which affects the driver. All entries are described in detail. All other menu entries are described in the PLB-21 manual. For detailed instructions see the PLB-21 manual.

Menu root

- Pulseparameter
  - Width
  - Reprate
  - Cur(int/ext)
  - Simmer
- Trigger
  - Mode
  - Edge
- Config
  - Occur(not in HW version 1.2)
  - Scut
  - Noload
  - SStart
- Defaults
  - Def. pwron
  - Load defaults
  - Save defaults
- Temperature
  - Dev. Off
  - Temp 1
  - Temp 2
  - Temp 3
- Measurement
  - Uin
  - Udiode
  - IDiode

Pulseparameter

In this menu point can be modified the setpoint current and simmer current. See the device specific datasheet for detailed information.

Width
This value defines the width of the pulses generated by the internal pulse generator if the internal trigger is used. It is measured in steps of 0.1us.

Reprate
This value defines the repetition rate of the pulses generated by the internal pulse generator if the internal trigger is used. It is measured in steps of 1 Hz.

Cur (int/ext)
This value defines the setpoint current. It can be switched between internal (int) and external (ext) setpoint by pressing the F1 key.
When using the internal setpoint, the value can be modified by the user.
When using the external setpoint, the value shown is measured value supplied at Pin 10 of the BOB connector. The display is updated every few seconds, so it is not accurate when using analogue modulation.

Simmer
A Simmer current is not available with a LDP-C series when using trigger modes internal or external.

Trigger
The LDP-C supports various trigger modes. These are selected in this Submenu.

Trigger
Possible values are “internal”, “external” and “CW”. Please note that any change disables the output.

Edge
This value defines the speed of the rising edge. Possible ranges from 0 to 255. The smaller the value is, the smaller is the rise time. It is not used in CW mode.

Config
The LDP-C has some additional safety features which can be user enabled. This is done within this Submenu.

Occur (not in HW version 1.2)
Using the F1 key an additional over current protection can be enabled. If enabled, the LDP-C disables automatically if the output current rises below the given maximum value. The display shows the actual value and it can be modified using the jogdial. If disabled, the display will just read “disabled”.

Scut
If enabled, the LDP-C disables automatically if a shortcut on the output clamps during operation is detected. Please note that this feature will not operate properly when the setpoint current is modulated or a compliance voltage below 1 volt is used.

Noload
If enabled, the LDP-C disables automatically if the load has been disconnected during operation. Please note that this feature will not operate properly if the setpoint current is modulated.

Start
The value shown here is the time span in which the LDP-C raises its output current to the given setpoint when enabled.

Config
The driver can load a default setting each time it powers up or the user commands it to do so. This is done within this Submenu.

Def. pwron

When enabled, the driver loads the saved settings each time it powers up.

Load
When activated via turning the Jogdial or the ENTER key all internal registers are changed to the previously saved values. The output stage has to be re- enabled via the L_ON bit or the FIRE Key afterwards

Save
When activated via turning the Jogdial or the ENTER key all internal registers are stored into an internal EEprom for later usage.

Temperature
The LDP-C 120-20 is equipped with several temperature sensors. In this submenu, the actual and shutdown temperatures can be read and modified. All values are in °C.

Dev. Off
This shows the user defined shutdown temperature. If the LDP-C 120-20 reaches this temperature during operation, the output will be disabled and an error message is displayed. It can be modified within 40….80 °C.

Temp 1…3
This shows the actual temperatures measured by the sensors of the LDP-C 120-20.

Measurement
This submenu holds some runtime measurement information.

Uin
This shows the measured value of the supply voltage.

Udiode
This shows the measured value of the compliance voltage of the connected load. The output must be enabled for a correct result. Please note that this is not a real-time measurement. If the Setpoint is modulated, the display may show incorrect values. In that case use the signal of the analogue current monitor at pin 9 on the BOB connector with appropriate measurement equipment.

Idiode
This shows the measured value of the current flow through the connected load.

If an Error Occurs
If an error occurs during operation the pulse output is switched off, the "pulser_ok_ext" signal on the BOB connector is pulled low and a message is displayed on the PLB-21. If no other action is described on the display, a toggle of the ENABLE pin resets the error condition and re- enables the driver.

Controlling the driver via a PC

Introduction

When the LDP-CW is connected to a PC, it allows communications over a serial text interface as well as the PicoLAS protocol. While the text interface is designed for communication with a terminal program, the PicoLAS protocol is designed as a system interact protocol.

The switching between the two protocols occurs automatically as soon as the driver receives a certain sequence. The corresponding commands are:

- **PING** for the PicoLAS protocol
- "**init**" followed by <Enter> for the text interface

Description of the RS232 Interface

The LDP-CW 20-50 implements a standard RS232 interface. It can be connected to a PC using a three-wire connection. The connection settings are:

Baud rate	115200
Data bits	8
Stop bits	1
Parity	even

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The Serial Text Interface

The following section describes the structure and commands of the text interface.

Structure

Every command that is sent to the LDP-CW must be completed with a CR (Enter). It consists of a command word followed by one or more parameters. If the command was successfully executed a "00" is sent, otherwise a "01". If there is an error pending, the response will be "10", otherwise "11". If the command requires an answer parameter, this parameter is sent before the confirmation is given.

Example:

The user would like to read out the actual setpoint current:

User input: gcur<Enter>

Output of the LDP-CW: 12.25<CR><LF>

00<CR><LF>

Example 2:

The user would like to set a new setpoint current:

User input: scur 25.7<Enter>

Output of the LDP-CW: 25.7<CR><LF>

00<CR><LF>

Input is done in ASCII code and is case sensitive. Every terminal can be used which supports this standard.

Commands for the LDP-CW

The following table contains a command reference for the LDP-CW.

Command	Parameter	Answer	Description
scur	Current in A	--	Sets the pulse current to the indicated value. A dot is used as decimal point. No more then two decimal places are used! (12.225 is the same as 12.22)
gcur	--	Current in A	Outputs the present output current
gcurmin	--	Current in A	Outputs the minimum output current
gcurmax	--	Current in A	Outputs the maximum output current
on	--	--	Activates the output
off	--	--	Deactivates the output
curext	--	--	use external current setpoint
curint	--	--	use internal current setpoint

Command	Parameter	Answer	Description
gerr	--	32 bit number	Outputs the ERROR register
gerrtxt	--	error text	description of every pending error
slstat	32 bit number	--	Sets the LSTAT register to the value
glstat	--	32 bit number	Outputs the LSTAT register
gserial	--	serial number	Returns the device serial number
gname	--	device name	Returns the devices internal name
ghwver	--	hardware version	prints out the hardware version
gswver	--	software version	prints out the software version
ps	--	current settings	Prints out an overview of all settings
loaddefault	--	--	loads previously saved settings
savedefault	--	--	saves the current settings as defaults
sp	32 bit number	--	Sets the parameter of the P-controller
gp	--	P value	returns the parameter of the P-controller
gpmin	--	minimum P value	returns the minimum parameter of the P-controller
gpmax	--	maximum P value	returns the maximum parameter of the P-controller
si	32 bit number	--	Sets the parameter of the I-controller
gi	--	I value	returns the parameter of the I-controller
gimin	--	minimum I value	returns the minimum parameter of the I-controller
gimax	--	maximum I value	returns the maximum parameter of the I-controller
sd	32 bit number	--	Sets the parameter of the D-controller
gd	--	D value	returns the parameter of the D-controller
gdmin	--	minimum D value	returns the minimum parameter of the D-controller
gdmax	--	maximum D value	returns the maximum parameter of the D-controller

If an Error Occurs

If an error occurs during operation the pulse output is switched off and the return value of a command is no longer "00" or "01" but "10" or "11". Errors have to be acknowledged with a toggle of the ENABLE signal, otherwise switching on again of LDP-CW output is not possible. For more details see the description of the ERROR register.
To retrieve the error, use the **gerr** command for the content of the ERROR register or the **gerrtxt** command for a human readable form.

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The PicoLAS Protocol

The following section describes the structure and possible commands of the PicoLAS protocol.

Structure

Each transmission consists of 12 bytes – called a frame as follows – which must be sent consecutively. Otherwise the system times out and the transmission must start again from the beginning.

A frame has a fixed structure. The first two bytes describe the command, the following eight bytes the parameters, followed by one reserved byte and one checksum byte. The checksum is calculated out of the first 11 bytes which are linked by a bitwise XOR.

Thus a frame has the following structure:

Byte	Meaning
1	Bit 8-15 of the command
2	Bit 0-7 of the command
3	Bit 56-63 of the parameter
4	Bit 48-55 of the parameter
5	Bit 40-47 of the parameter
6	Bit 32-39 of the parameter
7	Bit 24-31 of the parameter
8	Bit 16-23 of the parameter
9	Bit 8-15 of the parameter
10	Bit 0-7 of the parameter
11	Reserved, always 0x00
12	Checksum

A properly received frame must be acknowledged by the recipient with an answer, which is also a frame. If the acknowledgement does not occur then the command has not been processed and the sending procedure should be repeated.

If the recipient recognizes the command as valid, but not the parameters, then it will answer with a ILGLPARAM (0xFF12) as command.

In the case that the recipient receives an invalid command it will answer with UNCOM (0xFF13).

If a faulty checksum is recognized then the answer is RXERROR (0xFF10). If this error occurs often then the connection should be checked.

Using the REPEAT (0xFF11) command the recipient can instruct the sender to send the most recent frame again.

General Commands

The following list contains an overview of the general commands which are supported by every product from PicoLAS which makes use of this protocol. The explanation of the individual commands is given further below.

Command Name	Sent Frame		Answer Frame	
	Command	Parameter	Command	Parameter
PING	0xFE01	0	0xFF01	0
IDENT	0xFE02	0	0xFF02	ID
GETHARDVER	0xFE06	0	0xFF06	Version
GETSOFTVER	0xFE07	0	0xFF07	Version
GETSERIAL	0xFE08	0 … 20	0xFF08	Refer to description
GETIDSTRING	0xFE09	0 … 20	0xFF09	Refer to description

PING

This command is used to determine the presence of a connected driver and to initialize its interface. It does not change any registers. The command parameter is always 0, the answer parameter too.

IDENT

This command is used to determine the device ID of an attached recipient. It has no effect on the condition of the recipient. The parameter is always 0. The answer contains the ID.

GETHARDVER

Instructs the driver to send back the version number of its hardware. The parameter is always 0. The answer contains the hardware version number. The format of the answer is:
0x000000<major><minor><revision>. In other words, one byte for each of the three elements of the version number.
As example, version 1.2.3 has the parameter 0x000000010203.

GETSOFTVER

Instructs the driver to send back the version number of its firmware. The parameter is always 0.
The answer contains the software version of the recipient. The format of the answer is:
0x000000<major><minor><revision>. In other words, one byte for each of the three elements of the version number.
As example, version 2.3.4 has the parameter 0x000000020304.

GETSERIAL

Instructs the driver to send back its serial number. If 0 is sent as parameter, the answer contains the number of (ASCII) digits of the serial number; otherwise the respective position of the serial number is sent in ASCII format.

GETIDSTRING

Instructs the driver to send back its name. If 0 is sent as parameter, the answer contains the number of digits of the string, otherwise the respective position of the serial number is sent in ASCII format.

Commands for the driver

The following table contains a list of the commands which the LDP-CW supports in addition to the generally applicable commands. An explanation of the individual commands and its parameters follows afterwards.

Command	Sent Frame		Received Frame	
	Command	Parameter	Command	Parameter
GETSOLL	0x0010	0	0x0101	32 bit value
GETSOLLMIN	0x0011	0	0x0101	32 bit value
GETSOLLMAX	0x0012	0	0x0101	32 bit value
SETSOLL	0x0013	Refer to description	0x0101	32 bit value
GETSOLLEXT	0x0014	0	0x0101	32 bit value
GETLSTAT	0x0020	0	0x0103	32 bit value
GETERROR	0x0021	0	0x0114	32 bit value
GETREGS	0x0022	0	0x0105	64 bit value
SETLSTAT	0x0023	Refer to description	0x0103	32 bit value
CLEARERROR	0x0024	0	0x0104	0
SAVEDEFAULTS	0x0027	0	0x0112	0
LOADDEFAULTS	0x0028	0	0x0112	0
GETKPMIN	0x0040	0	0x010A	32 bit value
GETKPMAX	0x0041	0	0x010A	32 bit value
GETKP	0x0042	0	0x010A	32 bit value
SETKP	0x0043	Refer to description	0x010A	32 bit value
GETKIMIN	0x0044	0	0x010B	32 bit value
GETKIMAX	0x0045	0	0x010B	32 bit value
GETKI	0x0046	0	0x010B	32 bit value
SETKI	0x0047	Refer to description	0x010B	32 bit value
GETKDMIN	0x0048	0	0x010C	32 bit value
GETKDMAX	0x0049	0	0x010C	32 bit value
GETKD	0x004A	0	0x010C	32 bit value
SETKD	0x004B	Refer to description	0x010C	32 bit value

Description of the Individual Commands

GETSOLL
The return value contains the actual setpoint value in steps of 0.01A.

GETSOLLMIN
The return value contains the minimum setpoint value in steps of 0.01A.

GETSOLLMAX
The return value contains the maximum setpoint value in steps of 0.01A.

SETSOLL
This command sets the current setpoint to the given value in steps of 0.01A. The value must be within the borders defined by the minimum and maximum current values given by the *GETSOLLMIN* and *GETSOLLMAX* command.
The return value contains the actual setpoint value.

GETSOLLEXT
The return value contains the measured and converted value of the external analogue setpoint in steps of 0.01A.

GETLSTAT
This command returns the value of the LSTAT register. For a complete description of this register see below.

GETERROR
This command returns the value of the ERROR register. For a complete description of this register see below.

GETREGS
This command returns the value of the LSTAT and ERROR register combined in a single 64bit value. The lower 32bit represents the LSTAT register, the upper 32bit the ERROR register.

SETLSTAT
This command sets the LSTAT register to the given value. The return value contains the new register value.

CLEARERROR
This command clears a part of the internal ERROR register. For a detailed description of the ERROR register see below.

SAVEDEFAULTS
This command saves all settings to an internal EEProm.

LOADDEFAULTS
This command loads previously saved settings into the driver.

GETKPMIN
The return value contains the minimum value of the P-controller.

GETKPMAX
The return value contains the maximum value of the P-controller.

GETKP
The return value contains the maximum value of the P-controller.

SETKP
This command sets the value of the P-controller to the given value. The value must be within the borders defined by the minimum and maximum current values given by the *GETKPMIN* and *GETKPMAX* command.
The return value contains the actual value.

GETKIMIN
The return value contains the minimum value of the I-controller.

GETKIMAX
The return value contains the maximum value of the I-controller.

GETKI
The return value contains the maximum value of the I-controller.

SETKI
This command sets the value of the I-controller to the given value. The value must be within the borders defined by the minimum and maximum current values given by the *GETKIMIN* and *GETKIMAX* command.
The return value contains the actual value.

GETKDMIN
The return value contains the minimum value of the D-controller.

GETKDMAX
The return value contains the maximum value of the D-controller.

GETKD
The return value contains the maximum value of the D-controller.

SETKD
This command sets the value of the D-controller to the given value. The value must be within the borders defined by the minimum and maximum current values given by the *GETKDMIN* and *GETKDMAX* command.
The return value contains the actual value.

Register description

Description of the LSTAT Register

The following list contains a description of the individual LSTAT bits. These can be read with GETLSTAT and written with SETLSTAT. With SETLSTAT a complete 32 bit word must always be written. Thus, to change individual bits, first the register must be read out with GETLSTAT, then the desired bits changed and then with SETLSTAT passed again to the LDP-CW.

Bit	Name	Read/Write	Meaning
0	L_ON	Read/write	Switch on/off the pulse output. Note: that this bit is automatically set high every time the driver is powered on.
1	ISOLL_EXT	Read/Write	When "1" the external setpoint current is used
2	PULSER_OK	Read	Indicates that the driver is in no error condition
3	ENABLE_OK	Read	Indicates that the external enable is given
4	DEFAULT_ON_PWRON	Read/Write	When "1" the driver will load the default values at each power-up.
5-31	Reserved	Read	Reserved

Description of the ERROR Register

The following list contains a description of the individual bits of the ERROR register. A "1" as a bit leads to a deactivation of the drivers output.

The Bits 0 and 1 are cleared every time the ENABLE pin is set low or when the CLEAERROR command is used.

The Bits 6 and 7 are set during the power on self test. They can not be cleared by the ENABLE pin or the CLEARERROR command. If one of these bits is set, the supply voltage should be switch off and on again. If the error persists, the LDP-CW needs to be repaired.

Bit	Name	R / W	Meaning
0	DRV_OVERTEMP	Read	Indicates an over temperature shutdown of the output stage.
1	DRV_FAIL	Read	Indicates a shutdown of the LDP-CW due to a load failure or an over current
2	reserved	Read	Reserved
3	reserved	Read	Reserved
4	CFG_CHKSUM_FAIL	Read	Indicates that the internal configuration register is corrupt. If this error persists, the LDP-CW needs to be repaired.
5	reserved	Read	Reserved
6	CAL_CHKSUM_FAIL	Read	Indicates that the internal calibration registers are corrupt. If this error persists, the LDP-CW needs to be repaired.
7	DEF_CHKSUM_FAIL	Read	Indicates that the internal default registers are corrupt. The default values should be re- saved.
8	reserved	Read	Reserved
9-31	Reserved	Read	Reserved

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